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SUBSTITUTE SPECIFICATION

SPECIFICATION

METHOD FOR MEASURING TEMPERATURE USING MINUTE SIZE

TEMPERATURE SENSING ELEMENT

Technical Field

The present invention relates to a temperature measuring method using a minute size temperature sensing element. More specifically, it relates to a novel temperature measuring method capable of measuring the temperature accurately over a wide range, using a temperature sensing element comprising a carbon nanotube containing columnar gallium.

Background Art

After the discovery of the carbon nanotube in 1991, a number of studies have been carried out by many researchers. Various technical improvements and methods of utilization have been discovered concerning carbon nanotubes. For example, nowadays, it is utilized widely for field effect devices, probe top ends for scanning probe microscopes, superconductive materials, highly sensitive microbalances, structural materials, minute forceps for the nanoscale operation, parts for gas detectors, hydrogen energy storage devices, or the like. Moreover, studies have been executed actively for containing the various fillers in the carbon nanotube (Document 1 and Document 2).

For example, as the substances to be contained in the carbon nanotube, a metal such as lead, tin, copper, indium, mercury, an alkali metal such as lithium, sodium, potassium, rubidium, and cesium, a superconductor such as lead, tin, and gallium, a semiconductor such as silicon, germanium, gallium arsenide, zinc selenide, and zinc sulfide, a magnetic material such as samarium, gadolinium, lanthanum, iron, cobalt and nickel, and a mixture thereof have been discussed.

Moreover, an organic molecule semiconductor such as a naphthalene, anthracene, phenanthrene, pyrene, and perylene, an organic dye molecule such as a cyanine dye and a β -carotene, and furthermore, a gas molecule such as hydrogen fluoride, methane, and ethane, or the like have been discussed.